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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
PAPPAS, PETER	
ART UNIT	**PAPER NUMBER**
2671	7

DATE MAILED: 06/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/998,380	UNGAR, PAUL JEFFREY
	Examiner	Art Unit
	Peter-Anthony Pappas	2671

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12,14-29 and 31-38* is/are rejected.

7)☒ Claim(s) *13 and 30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1. Claims 13 and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-6, 8-12, 15-29 and 31-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan et al. (U.S. Patent No. 6, 384, 824 B1).

4. In regards to claim 1 Morgan et al. teaches a multi-pass system for bump-mapping into an environment map, wherein a reflection vector of a perturbed normal, at a given pixel position, is generated during the first pass. In the second pass at least one texel in an environment map is accessed based on a previously generated reflection vector, thus showing that said reflection vector is stored in a form of memory between said first and second pass so to allow for further processing to be accomplished of said reflection vector. Both bump mapping and environment mapping effects can be applied in shading on a per-pixel basis (column 4, lines 20-31 and 61-62; Fig. 4; Fig. 6).

Morgan et. al. teaches that reflection vector color (R_c), which is derived from the reflection vector, can be stored temporarily in the frame buffer (column 9, lines 12-18, and Fig 6, 650). Morgan et al. fails to explicitly teach storing a reflection vector in a pixel. Applicant discloses a pixel is defined as a data structure, which is used to represent a picture element (Specification, p. 4, lines 16-17). However, it would have been obvious to one skilled in the art, at the time of the applicant's invention, to utilize said frame buffer to store reflection vector data as a reflection image, because Morgan et al. teaches that said frame buffer is already used to store R_c, a derivative of said reflection vector, said reflection vector must maintained between passes, and by utilizing said frame buffer for the storage of said reflection vector data it would not require the addition of memory to said computer graphics system, but instead allow for preexisting memory to be utilized, thus allowing for the further optimization of said system in regards to the usage of already available storage.

Morgan et al. teaches the accessing of at least one texel (environment texture sample) from an environment map based on a generated reflection vector, which is represented by an overloaded lighting equation (column 4, lines 20-31).

During a second pass the texel(s), retrieved by the environmental mapper, are then outputted to a lighting block where computations (additional shading, lighting, and/or coloring operations) are performed to create a final image of the geometry data bump mapped into an environment map, in which the final image has a texture based on said texel(s) retrieved by the environment mapper. Final pixel data is then output to a frame

buffer (memory), which is then sent to a display 660 (column 9, lines 19-35; column 14, lines 47-51; Fig. 6).

5. In regards to claim 2 Morgan et. al. teaches a lightning equation used to determine a lighting color value L_c, in which the variables of said lighting equation include, but are not limited too, an ambient light color, a diffused light color, a specular light color and an environment mapping color coefficient (column 7, lines 21-45). The terms in the lighting equation can be set so to represent a reflection vector R. The result being the output value L_c, of the overloaded lighting equation, equals a reflection vector R (column 7, lines 60-67, and column 8, lines 1-4). It is noted that for the loading of said reflection vectors into memory that the retrieving and storing of relevant pixel data, tied to said reflection vectors, would have to done to facilitate loading.

Morgan et. al fails to explicitly teach red, green and blue color data (RGB). It is extremely well known for computer graphics system to operate in a conventional color space such as RGB (official notice; MPEP § 2144), and thus would have been obvious to one skilled in the art, at the time of the applicant's invention, to utilize said conventional color space, because by utilizing said conventional color space, for a given computer graphics system, allows for uniformity, which in turn more easily allows said computer graphics system to be incorporated with additional graphic systems, hardware and techniques for further processing and display.

6. In regards to claim 3 Morgan et. al. teaches a reflection vector can be represented by said lighting equation, which includes a viewing vector V representative of data at a given pixel position (column 7, lines 12-18).

7. In regards to claim 4 Morgan et. al. teaches R_c can be obtained via the evaluation of an overloaded lighting equation. R_c is then converted to texture coordinates, which are in turn used to look up at least one texel in an environment map (column 8, lines 5-35).

8. In regards to claim 5 the rationale disclosed in the rejection of claim 1 is incorporated herein.

9. In regards to claim 6 the rationale disclosed in the rejection of claim 1 is incorporated herein.

10. In regards to claim 8 the rationale disclosed in the rejection of claim 1 is incorporated herein.

11. In regards to claim 9 the rationale disclosed in the rejection of claim 1 is incorporated herein.

12. In regards to claim 10 the rationale disclosed in the rejection of claim 1 is incorporated herein.

13. In regards to claim 11 Morgan et. al. teaches texture memory 606 used to store a bump map 622 and an environment map 652. In pass one steps 410 and 420 are performed. In pass Two steps 430 and 440 are processed (column 10, lines 26-33; Fig. 4; Fig. 6).

14. In regards to claim 12 Morgan et. al. teaches an environment map that can be, but is not limited to, a cubic or spherical environment map (column 8, lines 32-35).

15. In regards to claim 15 Morgan et al. teaches a texture memory 606, comprising bump map 622 and environment map 652 (Fig. 6). A final image representative of the

geometry data bump (texture) mapped into an environment map is then output for display (column 8, lines 66-67, and column 9, lines 1-35). The rationale disclosed in the rejection of claim 1 is incorporated herein. It is noted that said texture map and said environment map are both considered texture maps, however they do not necessarily comprise the same textures.

16. In regards to claim 16 the rationale disclosed in the rejection of claim 5 is incorporated herein.

17. In regards to claim 17 the rationale disclosed in the rejection of claim 6 is incorporated herein.

18. In regards to claim 18 the rationale disclosed in the rejection of claim 12 is incorporated herein.

19. In regards to claim 19 the rationale disclosed in the rejection of claim 1 is incorporated herein.

20. In regards to claim 20 the rationale disclosed in rejection of claim 1 is incorporated herein.

21. In regards to claim 21 the rationale disclosed in the rejection of claim 3 is incorporated herein.

22. In regards to claim 22 the rationale disclosed in the rejection of claim 6 is incorporated herein.

23. In regards to claim 23 the rationale disclosed in the rejection of claim 12 is incorporated herein.

24. In regards to claim 24 the rationale disclosed in the rejection of claim 1 is incorporated herein.

25. In regards to claim 25 the rationale disclosed in the rejection of claim 15 is incorporated herein.

26. In regards to claim 26 Morgan et. al. teaches a method, system and computer program product for bump-mapping into an environment map via multiple passes (column 4, lines 10-12; Fig. 8, 804). Specifically Morgan et al. teaches a computer system 800 that includes one or more processors, graphics subsystem 803, main memory 808 and secondary memory 810. The secondary memory can include a storage drive 814 that reads from and/or writes to a removable storage unit 818. The removable storage unit 818 includes a computer usable storage medium having stored therein computer software and/or data (column 10, lines 35-67, and column 11, lines 1-33). The rationale disclosed in the rejections of claims 1 and 15 are incorporated herein.

27. In regards to claim 27 the rationale for the rejection of claim 5 is incorporated herein.

28. In regards to claim 28 the rationale for the rejection of claim 4 is incorporated herein.

29. In regards to claim 29 the rationale for the rejection of claim 12 is incorporated herein.

30. In regards to claim 31 Morgan et al. teaches a method, system and computer program product for bump-mapping into an environment map via multiple passes

(column 4, lines 10-12; Fig. 8, 804). Specifically Morgan et al. teaches a computer system 800 that includes one or more processors, graphics subsystem 803, main memory 808 and secondary memory 810. The secondary memory can include a storage drive 814 that reads from and/or writes to a removable storage unit 818. The removable storage unit 818 includes a computer usable storage medium having stored therein computer software and/or data (column 10, lines 35-67, and column 11, lines 1-33). The rationale disclosed in the rejections of claims 1 and 15 are incorporated herein.

31. In regards to claim 32 the rationale disclosed in the rejection of claim 2 is incorporated herein.

32. In regards to claim 33 the rationale disclosed in the rejection of claim 6 is incorporated herein.

33. In regards to claim 34 Morgan et al. teaches computer programs (also called computer control logic) are stored in main memory and/or secondary memory 810 (column 11, lines 56-57). In regards to a texture map comprising reflection data (reflection vector/image) and an environment map the rationale disclosed in the rejection of claim 15 is incorporated herein.

In regards to a processor for implementing the computer program logic the rationale disclosed in the rejection of claim 26 is incorporated herein.

In regards to a graphics subsystem the rationale disclosed in the rejection of claim 26 is incorporated herein. Morgan et. al teaches computer programs, when executed, enable the processor 804 to perform the features of the present invention

(column 11, lines 61-64). It is noted that said features of the present invention are those previously disclosed such as rasterizing an object using a texture map(s) and an environment map(s).

34. In regards to claim 35 Morgan et. al. teaches the graphics processing pipeline in Fig. 6, wherein a texture memory block 606 is connected to the texture applicator block 630 which is in turn connected to a frame buffer 650 through a lighting block 640. A rasterizer block is shown, which encompasses the texture applicator block. Thus, coupling a rasterizer to a texture memory block (part of the rasterizer block) and frame buffer block.

35. In regards to claim 36 it noted that an environment texture sample is considered a texture sample and that an environment map, from which an environment texture sample is retrieved, is considered the same as a texture map, from which a texture sample is retrieved. The rationale for the rejection of limitation (c) of claim 1 is incorporated herein.

36. In regards to claim 37 the rationale for the rejection of claim 15 is incorporated herein.

37. In regards to claim 38 the rationale for the rejection of claim 15 is incorporated herein.

38. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan et al. (U.S. Patent No. 6, 384, 824 B1), as applied to claims 1-6, 8-12, 15-29 and 31-38, in view of Ho et al. (U.S. Patent No. 6, 297, 833 B1), in further view of Fosner (*Microsoft*

Systems Journal: DirectX 6.0 Goes Ballistic With Multiple New Features and Much Faster Code).

39. In regards to claim 7 Morgan et al. fails to explicitly teach loading, retrieving and applying performed during a single pass through the graphics pipeline. Ho et al. teaches a multi-stage single pass graphics accelerator pipeline, used to map irregular textures to surfaces, in which loading, retrieving and applying are accomplished through the following grouped stages, respectively: front end stage, setup and rasterizer stages, texture and combiner stages (column 1, lines 55-58; column 2, lines 31-67, and column 3, lines 1-33; column 6, lines 46-63l; column 7, lines 36-58; column 8, lines 15-23; Fig. 7).

It would have been obvious to one skilled in the art, at the time of the applicant's invention, to incorporate a single pass graphics processing (accelerator) pipeline, as taught by Ho et al., as an alternative to that of a of multi-pass graphics processing pipeline, as taught by Morgan et al., because as taught by Fosner multi-pass rendering involves the rendering of a given scene a multiple number of times, resulting in a significant impact on the rendering time, however, utilizing new interfaces in combination with single pass rendering results in greatly improved performance for application that previously used multi-pass techniques.

40. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan et al. (U.S. Patent No. 6, 384, 824 B1), as applied to claims 1-6, 8-12, 15-29 and 31-38, in view of Voorhies et al. (U.S. Patent No. 5, 704, 024).

41. In regards to claim 14 Morgan et. al. fails to explicitly teach real time loading, retrieving and applying. Voorhies et al. teaches a method and apparatus for generating reflection vectors, without normalization, so to allow for the generation of surface reflections at real time speeds.

It would have been obvious to one skilled in the art, at the time of the applicant's invention, to incorporate the generation of surface reflections at real time speeds, as taught by Voorhies et al., into the system as taught by Morgan et al., because both Morgan et al. and Voorhies et al. lend to the use of normalized vectors and through such incorporation the quality of reflections would be improved allowing for a more realistic rendering to be presented.

Response to Arguments

42. In response to the applicant's remarks in regards to the 35 U.S.C. § 112 rejection of claim 23 said rejection has been withdrawal.

43. In response to the applications remarks in regards to the taking of Official Notice (i.e. for claims 1, 5, 8, 11, 13, 31, 34 ad 36), wherein the language "it is noted" has seemingly been interpreted as a statement of Official Notice, the Office clarifies by stating that said language serves only a means by which to convey the Office's interpretation or understanding of the respective claim language as it has been presented or simply to distinguish a point.

44. In response to applicant's remarks in regards to claim 7 that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce

the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case the reference entitled *Microsoft Systems Journal: DirectX 6.0 Goes Ballistic With Multiple New Features and Much Faster Code* has been supplied and incorporated into this action in lieu of a statement of Official Notice, as requested by the applicant.

45. In response to the applicant's remarks in regards to the rejections of claims 13 and 30 all remarks are considered moot in light of the withdrawal of said rejections.

46. In response to the applicant's remarks in regards to the rejection of claim 1 it is noted that applicant defines "pixel" as a data structure, which is used to represent a picture element and that "reflection image" is defined as an array of pixels, texel or intensity values that encode reflection data (Specification, p. 4). It is noted that the loading of a reflection image prior to the retrieving of an environment texture sample, via a reflection vector, is considered not be required as said claim discloses that said reflection vector is only stored in said reflection image and does not disclose that said reflection vector is retrieved from said reflection image.

It is maintained that a frame buffer, serving as a data structure for the storage pixel data pertaining to reflection data, wherein said reflection data is stored on a per-pixel basis in said frame buffer, wherein a plurality of said stored reflection data in said frame buffer constitutes a reflection image, meets, in combination with the respective rejection above, all the limitations of the respective claim.

47. In response to the applicant's remarks, in regards to claim 15, that Morgan et al. al. does not discuss a texture map from which a texture sample containing reflection data is retrieved Morgan et al. teaches a texture memory 606, wherein said texture memory 606 contains bump map 622 and environment map 652 (Fig. 6). A perturbed normal is retrieved from said texture memory, specially bump map 622, and used to represent a reflection vector. Said steps involve the access and processing of data from said texture memory 606, considered to store texture data, and are performed prior to said second pass, wherein previously processed data is used to access data in an environment map. Morgan et al. further teaches a final image representative of the geometry data bump (texture) mapped into an environment map is then output for display (column 8, lines 66-67, and column 9, lines 1-35; Fig. 4).

48. In response to the applicant's remakes, in regards to claims 20 and 31, see the rationale disclosed in the respective rejections above.

49. In response to the applicant's remarks in regards to claim 26 that Morgan et al. does not teach or suggest performing additional passes to create a texture map comprising reflection data, it is noted that the limitations for said claim do not disclose said stated process of creating a texture map, but instead read "a texture map comprising reflection data" (Amendments to the Claims, p. 7, lines 21.). However, Morgan et al. does teach a bump map 622, within texture memory 606 (Fig. 6).

Conclusion

50. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter-Anthony Pappas whose telephone number is 703-305-8984. The examiner can normally be reached on M-F 10:00am-7:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on 703-305-9798. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Peter-Anthony Pappas
Examiner
Art Unit 2671

PAP

MARK ZIMMERMAN
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